

NASA TECH BRIEF



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System for Etching Thick Aluminum Layers Minimizes Bridging and Undercutting

The problem:

To develop a system to etch thick aluminum layers ($\geq 25,000 \text{ \AA}$) for semiconductor device contacts. This system would have to yield maximum contact surface uniformity as well as minimize or eliminate bridging and undercutting of contacts due to the thickness gradient across a wafer of the deposited aluminum.

Definition problems are the limiting factor in determining how much aluminum may be used for contacts on semiconductor devices. If a single shot etch is used on thick aluminum layers, gross undercutting occurs; thus, undercutting becomes more critical as the contact area patterns become more narrow. When two separate aluminum evaporations are performed, each followed by a photoresist and etching operation, two problems are evident: (a) alignment of the second photoresist step and (b) interface problems between the two aluminum operations.

The solution:

A convenient four step process that produces a uniform contact surface and at the same time eliminates bridging and minimizes undercutting.

How it's done:

After the aluminum is deposited, the wafer is photoresisted with an inverse mask using the Kodak Thin Film Resist (KTFR) System. The wafer is then placed in an aluminum etch solution for a time sufficient to

remove approximately 30% of the aluminum. The photoresist is then removed and the wafer is again photoresisted by the same method as previously used. It is again placed in the aluminum etch solution where the remaining aluminum is removed. As the aluminum deposit gets greater, additional photoresist and etch steps may be required for optimum results.

Notes:

1. Application of this process can be used for contact materials other than aluminum.
2. Any thickness of contact material can be used providing the number of photoresist and etch steps is adjusting accordingly.
3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10400

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Bendix Corp.
under contract to
Marshall Space Flight Center
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